

problem. It is interesting in this connection to note how some of our waterfowl still follow the westward course at the foot of the glaciers of long ago, when they proceed westward from the eastern seaboard.

Then there is a second problem, probably the much greater, namely, the question of hybridization. This, when specifically distinct species are able to mate, appears to produce not Mendelian features such as we get in intraspecific crossings, but an endless number of variants most of which, as far as experiments in mollusk breeding show, are evanescent, but some are capable of continuing their kind. Some of these mutating complexes occupy limited areas and may be the result of a mixing of an immigrant waif with a local race. It seems to me what is necessary in the study of these small bivalves is the gathering of a large series of specimens (not a few isolated individuals as usually reach the Museum taxonomists) to see how fixed or variable the forms from each locality may be. Experimental breeding also seems indicated. Finally I am mindful that when one uses aquaria, in many cases a depauperization occurs in succeeding generations due to possibly a change in  $P_h$  or food, or a combination of other ecologic factors. I can't help but feel that immigrants brought into new environments may respond similarly.

The working laboratory taxonomist pondering upon the whence and why does not face an easy task in endeavoring the fixation of a name that is to hold for all time to come.

The geologic record, interesting as it may be, will furnish more factors but not a complete solution, for the days of yesterday presented problems with as many ramifications and interdigitations as the problems of today.

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## PERUVIAN LAND MOLLUSCA—II

By HENRY A. PILSBRY

The following snails were selected as new from a long series of Peruvian species sent by Dr. W. Weyrauch of Lima. They were collected by him during travels in the interior in the course

of his work on economic entomology. Further species will form a third installment of this series.

*PSADARA PIZARRO*, new species. Plate 11, Figs. 6, 6a

The very thin shell is narrowly umbilicate, the spire convex, periphery well rounded. The  $4\frac{1}{3}$  whorls are convex and joined by a deeply impressed suture, the last whorl only very slightly descending in front. Color very pale brown marked with three narrow dark brown bands which are interrupted into hyphen-shaped spots, the spots of the upper series connected with the suture by short radial brown streaks; the first  $1\frac{1}{2}$  whorls whitish. The surface is dull, the first whorl smooth, next whorl with close microscopic radiating striae. Subsequent whorls have low uneven wrinkles of growth and low papillae arranged in obliquely descending order though not very regular; on the base the papillae become lower. The aperture is wide, lunate, the peristome rather narrowly expanded in its outer and basal margins, dilated near the axial insertion, covering a small part of the umbilicus. Height 11 mm., diameter 18.7 mm.

Yanango, near Huacapistana, Peru, at 1800 meters. Type 180355 ANSP.

It belongs to the group of *P. catenifera* (Pfr.), of Colombia, and differs from *P. incarum* (Philippi) and other Peruvian species by the convex spire.

*EPIPHRAGMOPHORA ATAHUALPA*, new species. Plate 11, Figs. 4, 4a, 5

The shell is umbilicate, the umbilicus rapidly widening in the last half turn, contained about  $4\frac{1}{4}$  times in the diameter; depressed, the height contained 2.4 times in the diameter, the spire being but slightly convex, the periphery rounded. Color warm white with a chocolate band about 1.6 mm. wide above the periphery, bordered by a whitish band of the same width above and a wider one below. The peripheral whitish band is followed by a cinnamon-brown band, fading at its lower edge. The upper surface has a dull chamois tint above the light band, with two rather faint cinnamon-brown bands. The surface is glossy, with sculpture of fine, unequal growth wrinkles and a fine, weak malleation on the last whorl, which also shows some scattered traces of weak spiral grooves, the embryonic  $1\frac{1}{3}$  whorls being smooth. The rather weakly convex whorls increase slowly to the wide last turn. The suture descends rather deeply to the aperture. The aperture is strongly oblique, rounded, a little wider than high, showing dark and white bands inside. The

peristome is nearly white, the parietal wall forming less than one-fourth. It is narrowly reflected on the outer and basal margins, and the upper arc, which is less curved, is narrowly expanded.

Height 12.3 mm., diameter 29.5 mm.; width of aperture with peristome, 14.2 mm.;  $4\frac{1}{2}$  whorls.

Andahuaylas, Peru, 3100 meters elevation. Type 180206 ANSP.

This species resembles "*Helix*" *macasi* Higgins<sup>1</sup> in general form and coloration. It differs by the smaller aperture, its greatest width less than one-half of the diameter of the shell. In Higgins' figure of *macasi*, as well as in that of Kobelt,<sup>2</sup> the width of aperture exceeds half of the diameter. The width of umbilicus is about alike, being contained about 4.25 times in the diameter in our shell, and in *macasi* about 5 times. In Kobelt's figure it is distinctly smaller, contained 7 times in the diameter. Both of these authors give the number of whorls as 5, while our shell has only  $4\frac{1}{2}$ .

In view of these differences, and the rather wide separation of the localities, a specific status for the Andahuaylas snail seems indicated.

Fig. 5 is a smaller form of the species, from Ninabamba, near Ayacucho, Peru, at 1900 meter elevation. The specimen figured measured 23.5 mm. diameter, another 27.2 mm.

#### BULIMULIDAE

When I revised the classification of the Bulimulidae nearly fifty years ago the genus *Bulimulus*<sup>3</sup> was left with rather wide limits. The subgenera were grouped in three divisions according to the sculpture of the apical whorls. As genera are somewhat more narrowly limited now, it seems desirable to allow some groups of Bulimuli the generic status. I am therefore treating the mainly Peruvian "Division I, Bulimuli with smooth apical whorls"<sup>4</sup> as genus *Bostryx*. The limits of *Bostryx* remain as in Man. Conch. 10: 127-193.

<sup>1</sup> Proc. Zool. Soc. 1872, p. 686, pl. 56, figs. 6, 6a. Macas, Ecuador.

<sup>2</sup> Syst. Conchylien-Cabinet, *Helix*, pl. 182, figs. 10-12.

<sup>3</sup> 1896, Nautilus 9: 112; Man. Conch. 10: 127; 1902, Man. Conch., Supplement to vol. 14, p. xxii.

<sup>4</sup> Nautilus 9: 114; Man. Conch. 14, Suppl. p. xxiii.

As in some other genera of Bulimulidae, the general shape of the shell is widely varied. Our fig. 19 represents one of the most slender species, and fig. 8, *Bostryx* (*Platybostryx*) *weyrauchi*, one of the shortest; but there are many transitions between these extremes.

**THAUMASTUS** (*Scholvienia*) **WEYRAUCH**, new species. Plate 11, Figs. 2, 2a

The shell is perforate, turreted, slender, regularly tapering to an obtuse apex, moderately solid though rather thin; nearly black with a narrow white band nearly 1 mm. below the suture and two about 1.5 mm. apart in the peripheral region, the upper peripheral band being visible above the suture on the spire; there is also a small light umbilical area. The apex is turned in, the first whorl subangular above with sculpture of thin axial riblets, the second rounded and somewhat shouldered, with strong axial riblets extending to the middle of the whorl, the lower half having fine striae. Later whorls are regularly and rather weakly convex. The oval aperture is acutely angular, above, broadly rounded at base, showing the bands within. The peristome is whitish, rather narrowly expanded, the columellar margin reflected. Parietal callus very thin and transparent.

Length 39.5 mm., diameter 15 mm.; length aperture 15.7 mm.;  $6\frac{1}{2}$  whorls. Type.

Length 46.5 mm., diameter 16 mm.

Carpapata, on the Rio Tarma, near Palca, Peru, 2300 meters. Type and paratype 179996 ANSP.

This is a slender, vividly colored species, with the apical sculpture strongly developed.

**THAUMASTUS** **ROBERTSI** **SATIPOENSIS**, new subspecies. Plate 11, Fig. 1

This shell is more slender than *T. robertsi* Pilsbry, with the apical whorls forming a higher, narrower cone.

Length 74.4 mm., diameter 34 mm.; length of aperture with peristome 39.6 mm.;  $6\frac{1}{4}$  whorls.

Satipo, near Huancayo, Peru, at 600 meters. Type 179990 ANSP.

**BOSTRYX** **HUARAZENSIS**, new species. Plate 11, Fig. 17

The shell is ovate with short, conic spire and a rather large umbilicus; white with interrupted bands of dark brown. In the type the last whorl has a series of small spots against the

suture, and two nearly continuous narrow bands, one in the middle of the upper surface (and ascending the spire), the other just below the periphery. The upper band is surmounted by a series of oblong spots which are partially connected at their upper ends. There is a double spiral series of dots at the periphery and another on the base. The whorls are rather strongly convex, the first  $2\frac{1}{2}$  uniform dull buff, smooth; subsequent whorls with irregularly spaced and partly rather coarse wrinkles of growth. The ovate aperture shows the bands within. Peristome thin and sharp, the columellar margin dilated above, white.

Length 16.5 mm., diameter 11.4 mm.; aperture 8.5 mm. long; 6 whorls.

Huarez, Santa Valley, 3100 meters elevation. Type 180000 ANSP.

Closely similar to *B. tumidulus* (Pfr.), but it is wider and more openly umbilicate.

*BOSTRYX MEGOMPHALUS*, new species. Plate 11, Figs. 15, 16

The shell is ovate with a nipple-shaped apex and large umbilicus contained about four times (more or less in different examples) in the diameter; rather thin but calcareous; white, with some small dark dots scattered on the spire. It becomes gray towards the lip. Surface matt, the embryonic whorls smooth, the later whorls having irregular, low wrinkles of growth. The initial  $1\frac{1}{2}$  whorls are quite convex, following whorls somewhat flattened, with a peripheral angle or low keel which is to a greater or less extent covered by the following whorl. Last whorl is rounded at periphery and narrowly rounded around the umbilicus. The ovate aperture is somewhat oblique, claret brown within. Peristome thin and sharp, the terminations approaching, outer margin unexpanded, the columellar margin running forward, dilated and claret brown.

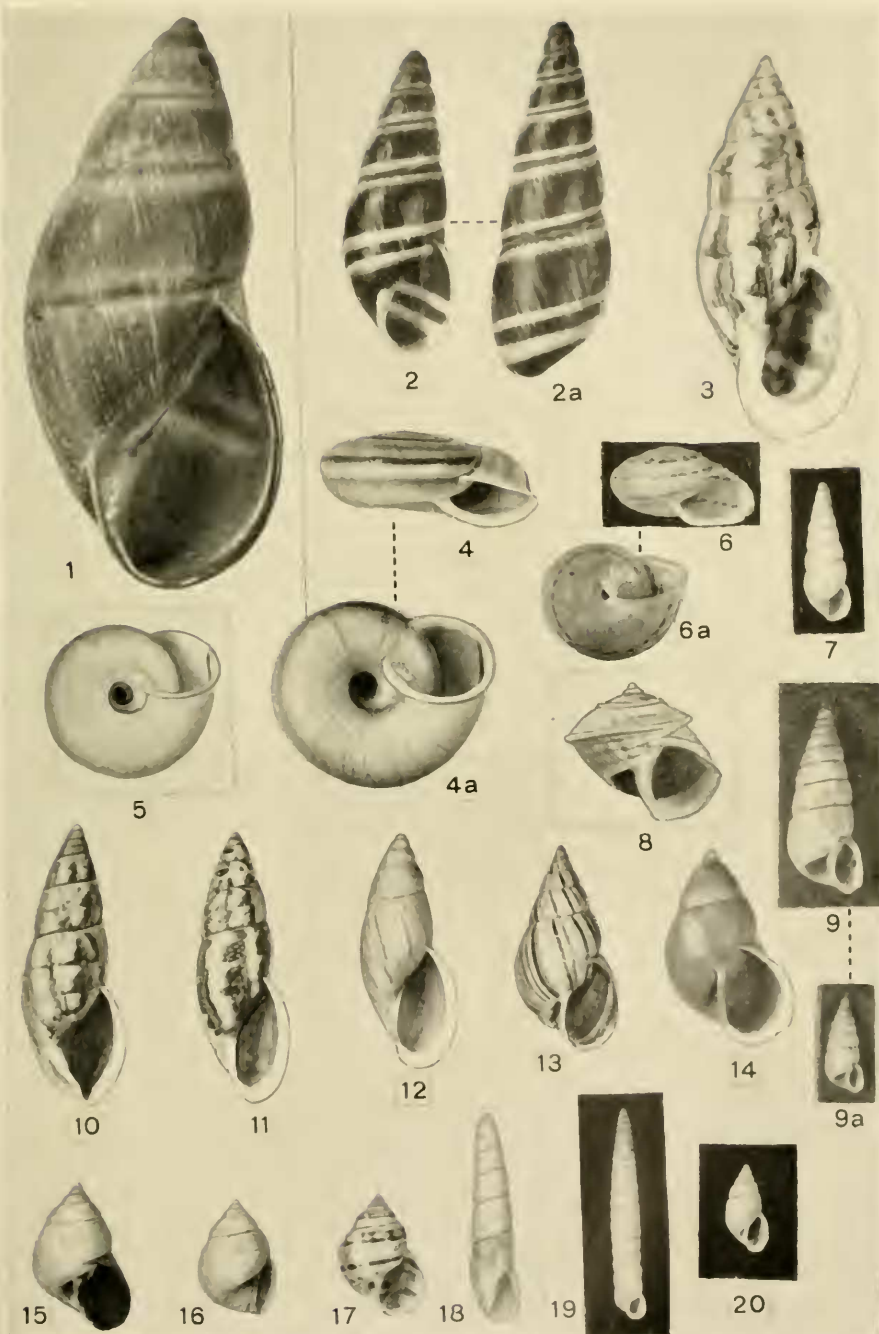
Length 19.3 mm., diameter 13 mm.; length of aperture 10 mm.;  $6\frac{1}{3}$  whorls. Type.

Length 15.8 mm., diameter 11.6 mm.; length of aperture 8.4 mm.; 6 whorls.

Acobamba (near Tarma), Peru, 3200–3400 meters elevation. Type and paratypes 180036 ANSP.

This species belongs to a little group including *B. binghami* Dall and *B. ptyalum* Dall (Proc. U. S. Nat. Mus. 38: 180, 181), from the Rio Pampas. Both are larger than *B. megomphalus*. *B. ptyalum* has a dark interior, like *megomphalus*, but it differs by having spiral striation and in various details of shape.





Peruvian Land Mollusks.



The mueronate apex in *B. mcgomphalus* varies in color, being uniform white in some examples, in others bicolored, white above and dark below, or entirely dark. The extent of dusky suffusion on the latter part of the last whorl varies, and in some examples it is wanting or faint. In one shell there is a brown band at the lower third of the third whorl.

*BOSTRYX DERELICTUS ASCENDENS*, new subspecies. Plate 11, Fig. 14

The base around the umbilicus is broadly rounded, not compressed and almost to be called bluntly angular, as it is in *derelictus*.

Length 26.2 mm., diameter 16 mm.; length aperture 14 mm.;  $6\frac{1}{2}$  whorls.

Ninabamba, near Ayacucho, Peru, 1900 meters elevation. Type 180017 ANSP.

*BOSTRYX ABANCAYENSIS*, new species. Plate 11, Fig. 20

The ovate shell has a conic spire and rather narrow umbilicus. It is white, becoming pale brown on the spire and apex. The whorls are moderately convex, joined by a well impressed suture. The surface is slightly glossy, marked with very slight growth lines, but the last whorl becomes somewhat plicate as it approaches the aperture. The ovate aperture is white within. Peristome sharp, unexpanded, but thickened within.

Length 9.2 mm., diameter 5 mm.; length of aperture 4.2 mm.;  $5\frac{3}{4}$  whorls. Type.

Length 11.4 mm., diameter 5.7 mm.; length of aperture 5.2 mm.;  $6\frac{1}{3}$  whorls.

Abancay, near Cuzco, Peru, 2300 meters elevation. Type and paratype 180001 ANSP.

*BOSTRYX (Pronacus) ANOMPHALUS*, new species. Plate 11, Fig. 7

The turreted shell has an almost closed umbilical perforation, and tapers regularly to the slightly obtuse apex. It is white with gray dots quite irregularly scattered. The somewhat glossy surface is smooth except for very inconspicuous lines of growth. The apex is somewhat obtuse, sometimes with a brownish tip, but white in other shells. The whorls are moderately convex, the last two sometimes a little more convex than those preceding. Suture well impressed. The aperture is oblique,



peristome thin, the columella straight, its margin reflected and appressed, nearly closing the perforation.

Length 18.2 mm., diameter 5.9 mm.; length of aperture 5.3 mm.;  $9\frac{3}{4}$  whorls. Type.

Length 17.8 mm., diameter 5.7 mm.; length of aperture 5 mm.;  $9\frac{3}{4}$  whorls.

Santa Eulalia Valley, near Chosiea, Peru. Type and paratypes 180002 ANSP.

It agrees with *B. acromelas* (Morelet) in the almost closed umbilical fissure and the scattered dots, but it is less slender and not cylindroid in the lower part.

**BOSTRYX** (*Geoceras*) **MULTIVOLVIS**, new species. Plate 11, Fig. 19

The shell is minutely subperforate, column-shaped, the upper third tapering; white, the upper 8 or 10 whorls faintly brown tinted with a few indistinct brown streaks. The surface is slightly glossy, with sculpture of very weak lines of growth, the first whorl smooth. The shell increases slowly in diameter up to about the twelfth whorl, after which it is cylindric. The whorls are rather weakly convex, the last being bluntly angular at the periphery, the base very slightly convex. The small aperture is oblique. Peristome thin and unexpanded, the columellar margin reflected and appressed except for a very minute crevice.

Length 27.8 mm., diameter 4.2 mm., at the penult whorl 4 mm.; length of apertures 3.2 mm.;  $22\frac{1}{2}$  whorls.

Ninabamba (near Ayacucho), Peru, 2000 meters elevation. Type 179994 ANSP.

This strange bulimulid shell is related to *B. cuspidatus* (Morelet), but of narrower form. It is more slender than any other *Geoceras* known, and has more whorls.

**BOSTRYX** (*Phenacotaxus*) **ENDOPLAX**, new species. Plate 11, Figs. 9, 9a

The regularly tapering, conic shell is slender, the diameter less than half of the length, broadly umbilicate, the umbilicus occupying about one-third of the diameter; warm white with a few indistinct brownish streaks. Surface matt, the first two whorls smooth, the rest evenly sculptured with close, thread-like striae about equal to their intervals. The whorls are nearly flat, joined by an impressed suture, the last whorl convex, carinate around the umbilicus. The rather narrow aperture is angular above and bluntly angular at the base. Peristome thin and simple, the margins approaching above. The large columellar

axis bears a horizontal lamella in the latter half of the penult and beginning of the last whorl. This lamella becomes very broad, reaching nearly to the outer wall in the latter part of the penult whorl, and its edge is strongly thickened there.

Length 11.9 mm., diameter 5 mm.;  $8\frac{3}{4}$  whorls.

Length 12 mm., diameter 4.7 mm.;  $8\frac{1}{2}$  whorls.

Ninabamba, near Ayacucho, Peru, at 1900 meters elevation. Type and paratype 180006 ANSP.

It is larger and more strongly tapering than *B. endoptyx* Pils. (Notulae Naturae No. 56), from Huánuco, in the Huallaga river valley, Peru.

**DRYMAEUS ANGULOBASIS**, new species. Plate 11, Fig. 10

The fusiform shell is rather openly umbilicate but the cavity narrows rapidly to a narrow perforation; moderately strong; white, with festooned axial stripes of dull plum purple (nearly black) speckled with white, and crossed by three narrow, interrupted spiral bands of the same dark color, a brownish smear behind the lip. There are 7 whorls, the first with *Drymaeus* sculpture, the rest weakly convex with low growth wrinkles; the last whorl concave above a prominent rounded ridge around the umbilicus. The aperture is vertical, oval, angular at both ends, being spout-shaped at the base. The peristome is white, expanded and sharp-edged, thickened within, with a purple interior, darkest on the callus within the lip. Columellar margin concave, purple within, reflected. The thin parietal callus is purple.

Length 37 mm., diameter 13.5 mm.; aperture 16 mm. long.

Oreja de Capelo, Peru, 1600 meters elevation. Type 180022 ANSP.

The type of this species was associated with the following *Drymaeus* which I have referred to *D. interpictus* (Martens), as a special "form." *D. subhybridus* (Da Costa) is a decidedly wider shell, but apparently near akin.

**DRYMAEUS INTERPICTUS** (Martens) form *diversipictus*, new form. Plate 11, Fig. 11

These shells have broad, irregular axial stripes flecked with white dots, and with traces of two or three spiral, interrupted bands of almost black color. It differs from *interpictus* in markings, that species have narrower, straight stripes. The rather widely expanded lip is pure white on both sides, hardly